

>> Hi everybody this is Chapter 3. This is the last of the introductory chapters of this course, but this chapter is really important to understand. We're going to talk a lot about digestion; a big part of nutrition. It's not so much what do you eat, but are you digesting and absorbing your food that you eat? Because a lot of people just don't digest well which means they're not absorbing the nutrients and they're not getting the benefit of the foods that they actually eat. Some alternative doctors will state that disease starts in the gut, because if you don't have a healthy digestive system that can lead to all kinds of health problems; food allergies, but environmental allergies, autoimmune diseases, all kinds of other issues which we'll go through a little bit in this chapter. So, the human body; this chapter in the book is big. It's large. Just concentrate if you're reading the textbook on the areas that I go over in the chapter, but basically if you've had anatomy and physiology courses or biology, some of this will be; some of it might be a little review. Again, we're going to concentrate on the digestive system. But just a little background, our body is made up of a hundred and trillions of cells and everything you eat gets into every single one of those cells, and if you don't have good nutrition you're not feeding your cells what they need to be healthy. So, whether it's skin cells or hair cells things that you can see or is it your heart cells, your muscle cells, the cells of your digestive tract, the cells in your kidneys, your liver and so forth. So, we have lots of cells that need certain nutrients. There are chemical reactions going on in every single cell in your body and, again, all those reactions are needed to keep you alive and healthy, but these reactions require certain nutrients every day. And, again, that's what this course is all about; what nutrients do your cells need? I know we don't think about that when we eat, like is this good for cells? But, that's basically everything you eat is saturating your cells with whatever it was, so are you saturating your cells with wholesome, you know, fruits and vegetables or with chemicals and food colorings on Doritos and sugar and artificial colors and things like that, pesticides? So, the cell is a basic structure and functional component of life. It's the basics of life and like I said, this is what nutrition; where it ends up is inside your cell. So, there's a picture of your cell. Inside here's the nucleus, probably most of you are familiar with that. You're DNA is in here and we're going to talk about DNA in chapter 6, but when, like I said, everything that you eat eventually gets digested and absorbed and gets into the cell membrane through the cell into the nucleus where the DNA is. And this is how some cancers can; a lot of cancers start is that DNA has gotten damaged and when DNA has gotten damaged now the cell is damaged and it can become cancerous. So, a lot of things in our foods and things in our environment damage our DNA, pesticides, GMO-type foods, chemical preservatives, and even sugar actually. We're going to talk about the mitochondria over here the mitochondria is very important. The cell membrane is very important. So, let's talk about the cell membrane. The cell membrane has to keep healthy, because it's like the door to your house. It regulates what comes in and out of the cell. The cell membrane is mostly made up of fat. That's why years ago with the whole low-fat diet craze it backfired for a lot of reasons. One of which is we need healthy kinds of fats, not bad fats, but the healthy fats for good health. We

need it for all of our cells, for the cell membrane because if we eat; we don't get enough healthy fats, the cell membranes start breaking down. If the cell membrane breaks down now your cell can breakdown and harmful products can through the cell and potentially damage the DNA. We also need fat for brains. We're going to get more into that, but the cell membrane again is mostly made up of fats, cholesterol which is a fat, a little protein and a little carbohydrates. That's a picture of a cell. All that orange, that's all fat. So, as you can see, it's mostly fat. So eating healthy fats like coconut oil, avocados, avocado oil, olive oil, nuts, things like that. The cytoplasm is everything inside the cell. In this slide, please know this term "mitochondria." The mitochondria are what we refer to as the power plants of the cell; the power plants. This is where your cell makes energy. Well, how does it make energy? It makes it from the foods that you ate. So, your foods get through, you know, you eat the food and we're going to talk about digestion in a little bit, but they get digested, they get absorbed, and they eventually end up inside the cell and the cell takes those foods and further breaks them down into energy. And the part of the cell that does that is called the mitochondria. Now, as we age, your cell's mitochondria start breaking down just like the rest of your body and you don't produce as much energy. Your mitochondria don't [dog barking] breakdown the food into energy as well as it used to and that's one reason why you have less energy as you get older. So, you know, how; remember we talked about how quickly or how slowly you age is a big part of function of how you live your life. Some people age quicker than others and the mitochondria breakdown quicker and you'll have less energy. So, again, this is where the mitochondria is. Your nucleus has the genetic material I was telling you about, the DNA. Again, you want to be careful what you expose your body to, what you breathe, what the air you breathe; research has shown, a lot of research that people that live in polluted areas have, can their DNA gets damaged quicker and they're more at risk for various disease; heart disease, lung diseases, cancers and so forth. Okay, so living right off a highway or things like that, you know, that's something with breathing and damaging substances you also eat and drink things that are not healthy and they're also damaging to that DNA and, again, we'll get more into that. So, your DNA if you've taken biology, you know that your cells regulate how your cells duplicate or replicate and make more cells. That's a little pictorial of the DNA. So, your cell needs good nutrition, the right amount and the right kinds of fats, proteins and carbs to function. I think we take if for granted about our cells but it's the whole of why, I'm to me, that eating well is taking care of our cells is really what we're doing. Okay, another topic we need to talk about briefly is hormones. So, hormones are just basically messengers in your body. They regulate to an extent what your body does. You know, we all know thyroid hormone; thyroid hormones helps either amp up or rev down your thyroid gland which helps you make energy as well, but we have other hormones, estrogen, testosterone. We have insulin and glucagon; I'm going to talk about those in a minute. In your body, each cell has a receptor site that binds to specific hormones. So, certain cells will have a receptor for certain hormones, whereas, other cells may not. They kind of fit together like

a lock and key mechanism. So, let's talk about insulin. Insulin is a hormone secreted by the pancreas, and it basically as most you know controls your blood sugar levels. After you eat, your carbs particularly get digested and absorbed depending on how many carbs you ate your sugar levels rise accordingly. So, as your sugar levels rise, you don't want too much sugar in your blood. Too much sugar in your blood is very, very damaging. Damaging to all your cells in your body and it's, too much sugar and walking around with high blood sugar levels not only increases your risk of diabetes, but having, if you have diabetes, you're at significantly increased risk of many diseases like heart disease, Alzheimer's, cancer, because sugar is damaging. I damages your nerves which is why a lot of diabetics lose sensation or they get tingling or numbness. It's damaging to your kidneys, to your eyes. It's because of the sugar. And many of us are walking around and we're not quite diabetic, but we're walking around with pretty high glucose levels because we eat so many carbs these days and drink so many sodas, but back to insulin. What does insulin do? When you eat carbs, your sugar levels go up, insulin is released by the pancreas and it takes those, that sugar out of the bloodstream, brings it into the muscles cells. Why does your muscle need sugar? Because it's going to breakdown into energy, into ATP and we'll talk about that in chapter 4. But for now, know that insulin and please know this for the quiz, insulin lowers blood sugar levels. How does it lower it? It takes the sugar out of the blood and brings it into the muscle cells; the muscle cells need it to produce energy. If you've eaten way too many carbs, after your muscles have had enough sugar, then the rest gets the excess gets stored in adipose cells which are fat cells. And this is why carbs are a big cause of being overweight and obese. Okay, so insulin lower blood sugar levels by taking the sugar out of the blood, bringing it into the muscles and sometimes into fat cells. If you have any questions about that, please email me or you can come see me during my office hours. Your textbook also goes through it. Glucagon does the opposite of insulin. It's a hormone secreted also by the pancreas, but basically this is now going to raise your sugar levels. There are times when maybe you've gone many hours between meals and your body has ran out of fuel, it's run out of sugar. And so, what is going to do? Well, glucagon gets released and it tells the liver to breakdown its stores of glucose back to glucose from glycogen. So, the storage form of glucose is called glycogen. Okay, we store glucose in our muscle cells and in our live cells and that storage form is called glycogen. When our sugar levels drop too low, and you might start getting shaky or cranky or irritable, glucagon is released and it targets the liver and it says, "Hey, we need some fuel here. Breakdown that glycogen back to glucose to raise the blood sugar levels back up." Okay, hopefully that's pretty clear. Again, if you are not sure please make sure your email me or come by so I can explain it to you. So, they each; insulin and glucagon control blood sugar levels one way or another. That's a picture of the pancreas. You can see right here it's kind of in the center of your abdominal cavity, whoops. On the right side is the liver here. The pancreas, it's very important. It secretes insulin and glucagon and as we'll see in a little bit it also secretes our digestive enzymes. A pancreatic cancer is a horrible, horrible cancer. I say that because when you're diagnosed usually

most people have a very short lifespan after that. It's a very poor prognosis, but again, most of these can be prevented. What increases your risk of pancreatic cancer are high-sugar diets, drinking a lot of sodas, too much of the wrong kinds of fats like vegetable oils and fried foods, smoking increases it as well, diabetes of course increases it. Okay, so the digestive system; let's talk about that. It starts in the mouth, goes way you know through your whole body; we'll talk about all that down to your butt basically. We're going to talk about how we digest our foods, the nutrients passed through the walls of the small intestine, get into the blood, and we breakdown foods both mechanically and chemically. Mechanically meaning chewing and chemically would be in your stomach and small intestine by the action of enzymes, digestive enzymes break your food down further, because you can imagine the food that you chew it's not going to go from that into your cells. It has to be further broken down. And you can see and your book has many pictures of, this is your esophagus here and it takes your food and goes into your stomach. From the stomach it digests it here with some enzymes and then it goes into the small intestine, lots of enzymes in the small intestine and then it goes into the; well, then it goes into the bloodstream from the small intestine, but anything that you did not digest, that your body can't use for one reason or another, goes into the large intestine. It starts in the lower right, goes up, and across, and down, and out lower left, okay number two. Some people are so constipated they've got poop all lined up all along in here. Some people they've done autopsies on people that are dead and found just 10, 20, 30, 40 pounds of poop. So, it's we're going to talk more about, well that in a little bit. Okay, I'm going to end this tape here. We'll, I'll take off again in just a minute and.